

CHRISTMAS ISSUE

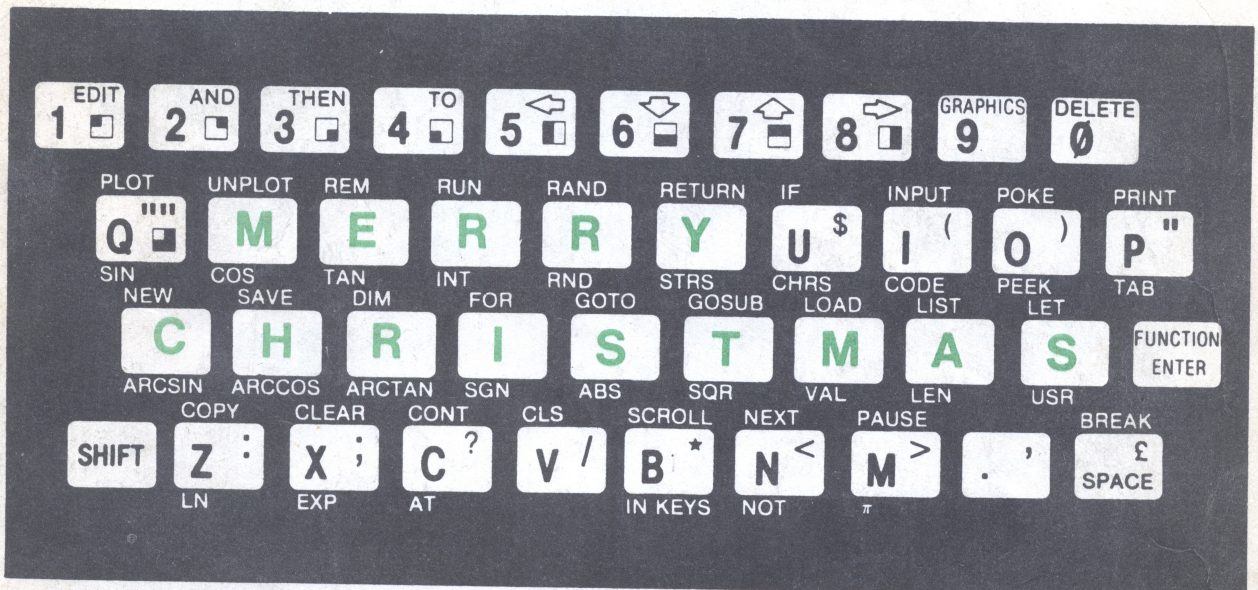
T-S Horizons

Affordable Quality for the Timex Computer User

DECEMBER

NO. 2

\$1.25



PROGRAMMING

MATRIX/CURSOR INPUT
USER-FRIENDLINESS
MEMORY REDUCTION

APPLICATIONS

FINANCIAL PROGRAM
NUMERICAL ANALYSIS
ZX CASH REGISTER

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JULY/AUGUST 1983

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► READ THE REVIEWS:

What a super product!...conceived and executed very nicely...and with quality components

(SYNTAX QUARTERLY Winter 82)

8K Nonvolatile memory is a gem! It has so many possible uses...I recommend this board most heartily.

(OKLAHOMA S.U.G. Newsletter 1/3)

We found the documentation to be far superior to that (of) most hardware we've received.

(S.U.N. Newsletter Nov/Dec 82)

For versatility this is even better than an EPROM...ranks quite high on the list of "must-haves"...

(SYNC Magazine Mar/Apr 83)

Provides the user with instant software...an extremely versatile memory extension...

(Z-WEST June 83)

INTRODUCTION

This memory board is designed to fill the transparent 8K block of memory (from 8K to 16K) in a ZX81-16K system. This area of memory is an ideal place to store, either permanently or temporarily, machine language routines or data which are to be used by the BASIC system.

Sample utilities are included with the kit.

The use of HM6116LP 2K CMOS RAM memory IC's with their own reserve power supply means that routines stored in the RAM are nonvolatile — the RAM retains its memory even when the ZX81 is switched off or reset. Moreover, being RAM, the routines you store in the memory are easily modified. The lithium cell supplied with the board will maintain sufficient reserve power for almost ten years.

ASSEMBLY

Complete step-by-step instructions in a 20 page manual make assembly of the board easy. The kit (pictured above) is complete with a silkscreened solder-masked printed circuit board, all capacitors, resistors, transistors, sockets, connectors, integrated circuits, and the lithium cell. The board is supplied with one 2K CMOS 6116LP-3 RAM — it will accommodate three more for a total of 8K.

| | |
|-----------------------------------|----------------|
| Complete kit with one 2K 6116LP-3 | \$32.95 |
| Additional three 6116LP-3 | \$18.00 |
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T-S HORIZONS welcomes article and program contributions either for pay or in exchange for advertising considerations.

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PAGE 1

T-S Horizons

Dear Readers,

Our first issue generated quite a lot of interest. The single feature that most people wanted to find out about was the announcement of the 8-inch disk drive and interface that would be available through T-S HORIZONS from Tracy Norris. At the announced price it seems almost too good to be true - tentatively under \$200.

Unfortunately, since the first issue was published, Tracy has become involved in a legal dispute concerning copyright restrictions. I was asked not to go into specifics, but Tracy has effectively been prohibited by the courts to publish any writings pertaining to any Timex-Sinclair product, until the case is heard in early December.

Tracy says the system will be made available early next year. Let me assure readers of T-S Horizons that the announcement of the disk drive in our premiere issue was not a marketing gimmick, but a sincere effort on Tracy's part to offer a useful and greatly needed product to TS1000 and ZX81 users. No one is more disappointed about the delay than I am. (I could use a couple of megabytes of cheap mass-storage.)

Another unfortunate result of Tracy's legal situation is the dearth of hardware features in this issue. Tracy had planned to write two to three articles per month for T-S Horizons. Since he gave me the "bad news" I have approached several hardware-oriented people for material. In the works for the next couple of issues is a simple tone generator, surplus keyboard expansion for the TS1000, and a simple LOAD/SAVE controller. Sonny Cline, of the FUN-2 user group in Indiana, came through at the last minute with some plans to install a reset switch. We really appreciate Sonny and people like him who have been supportive of our efforts here at T-S Horizons.

You know, one thing I've always hated was reading a magazine with a lot of typos. So when I finally got a chance to really check out the first issue after I got it from the printers, I nearly choked! I thought I had checked everything carefully. Well, hopefully typos and other errors will be kept to a minimum in this issue.

Kids Page has the first installment of a special graphics tutorial in this issue. Don't pass it over too lightly. The concepts are quite simple, but I've been surprised at how many users are unfamiliar with them.

It looks like Bill Johnson's new article is even better than his previous one. Also his "User Friendly?" feature scheduled for last issue has been included in this issue. The reader survey mentioned last time has been delayed to a future issue.

In this and the next few issues we'll be experimenting with new logos and page layouts. But to really make T-S Horizons into what we want it to be we need to know what you want it to be. Please drop us a line or two and let us know what you think so far.

Thanks

Rick Duncan
Rick Duncan

Focus

Introducing the 2068

Think of all the things you like about your TS-1000: low cost, one-touch entry of keywords, expandability, syntax check, and third party vendor and literature support.

Now think of all the things you dislike about your TS-1000: membrane keyboard, slow cassette loading, limited graphics, and RAM pack wobble. All these problems have been corrected in the new Timex Sinclair 2068, yet most of the qualities we've come to expect from TS-1000 computing have been preserved.

Some of the features that make it even more attractive are color and sound, of course, and high resolution graphics (512 x 192 pixels), automatic repeat, an on-off switch, a full space bar, upper and lower case printing, and a promised library of cassettes and EPROM cartridges.

After a long gestation, Timex appears ready to deliver the TS2068. So far the new computer has only been seen at computer shows. At the second annual Boston Timex Sinclair convention, a vendor was selling the 2068 (rumor had it that his sister works for Timex) and people were literally throwing hundred dollar bills at him to get one.

Timex is emphasizing the following applications:

- Word Processing - The 2068 has a port for a video monitor, and the display has an optional 64-character mode. An 80-column letter quality printer is promised for early 1984 for around \$200.00. The keyboard is type-writer style with automatic repeating.

- Game-playing - The 2068 is equipped with an Atari-type joystick port. A unique "Command Stick" (TS2090) is to be available when the computer is. Timex is touting a new flight simulator, a drag race game, and space game - all on plug-in cartridges.

- Telecommunications - A modem (TS2050) provides access to stock markets, home-shopping, electronic mail, and ticket reservations.

The computer is accompanied by a 300 page full-color user manual. There is many new commands like READ-DATA-RESTORE, DEF FN (define function), color commands, DRAW, CIRCLE, commands to address mass-storage devices, and more. TS1000 users will be impressed by the new symbols and punctuation like underlining, [brackets], \$braces\$, a copyright sign, a /backslash, an @, an ↑, a#, a %, an &, an ', and something to really get excited about, an!



MORELAND'S MEMO

MEMORY REDUCTION

By: Bill Moreland

The Timex computer is a wonderful machine, but it does have its limitations. With clever programming, some thought about alternatives, and a few hours spent "on" the computer most of the difficulties can be overcome.

For example, I have all of my accounting and cash register functions set up on a modified Timex 1000. (The modification is a fancy keyboard.) As many of you know, we own an entertainment store in Columbus. All of our retail transactions are entered on the TS1000 with receipts printed for the customer as well as business records. Each evening we off-load the program after printing the daily receipts, week-, month-, and year-to-date totals (long load and save times are a pain for us too!)

Originally, this program was about 39K. But after waiting 25+ minutes for loading or saving, we decided to shorten and modify the program as much as possible. Using the tricks described below, the power of the program was increased while reducing the total memory requirements to less than 8K.

Let's start with the little appreciated fact that the T/S stores numbers differently than it stores characters. The number "1" occupies seven bytes, while a character (even numbers stored as characters) are stored as single bytes.

For example, the expression

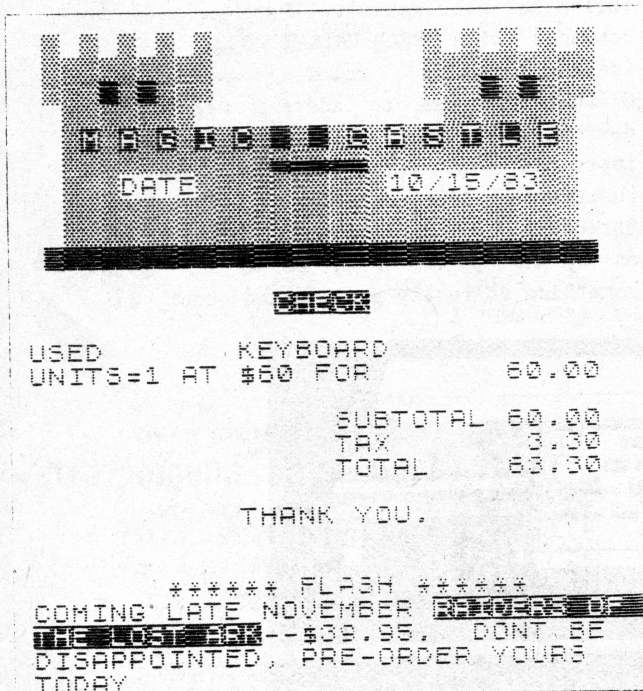
```
LET A = 1234
```

stores the number 1234 in ten (10) bytes in the variables area of memory (the number of bytes needed to store an integer is the number of digits plus six). On the other hand, the expression

```
LET A = VAL "1234"
```

stores the characters "1234" in four (4) bytes. (Formally speaking the leading and trailing quotes and the function VAL also occupy space--three (3) bytes.) A savings of three (3) bytes (including the other stored characters) does not sound like much, but the savings are cumulative.

A second technique that saves a lot of memory is the use of assignment statements to fix values in GOSUB or GOTO transfers. For example, using GOSUB 1000 for a transfer seems simple and straightforward. Yet, if statement 1000 is a major transfer point that is used as an entry many times during a program, then a simple `LET A = 1000`, `GOSUB A` sequence will save many bytes. To estimate how many, multiply the number of repetitions times the saving, eg. $25 \text{ (GOSUB calls)} * 9 \text{ (bytes)} = 225 \text{ bytes}$.



Cash register receipt from
Magic Castle Video.

Combining both of the above techniques in an example may help. Suppose you want to use statement 1000 as an entry point for a print routine that is called several ways by the main program. (We have forty different ways to get to a print point in our cash register program.) Or, suppose you want to use statement 1000 as an entry point for calculation and storage in a large array of data. Whatever the uses of these techniques, it looks like the following:

```

15 LET A = VAL "1000"
.
.
95 GOSUB A
.
.
200 GOSUB A
.
.
400 GOTO A

```

Each time the variable A is specified in a statement within the program instead of the four-digit integer, nine (9) bytes of precious memory are saved. Total savings will, of course, depend upon how many times A is used.

A third technique we use can save an enormous amount of memory when dealing with large data arrays. First the theory, then I will list a subroutine that may be very useful.

Most of us grew up learning the decimal number system (base 10), and we all learned that other number systems were possible, even desirable, under special circumstances. Storing large amounts of data in a limited memory is just such a circumstance. Since the computer uses a binary (base 2) number system, and since the computer can operate (translate) with other number systems quite easily, why not use a number system that maximizes the storage capacity of the machine?

Since most of us are not mathematicians, and are not interested in number theory, I won't go into the details of conversion from decimal to octal or hexadecimal or base 36. Suffice it to say we chose to use the base 256 as our number system because the Timex works well as an eight-bit processor on this number base.

Using this method, the Timex can store any integer between -32,767 and +32,767 (decimal) in two (2) bytes. Normally, as we saw above, a four-digit integer requires ten bytes of memory. So significant memory savings occur by using a simple conversion routine before storing a number in an array. The listing below shows a simple input and output procedure that incorporates the base 256 conversion. One caution: Remember to convert the contents of your array back to decimal form before operating on or printing the data!

```

9900 DIM F$(5,25)
9910 FOR X=1 TO 5
9920 INPUT ZX
9930 LET F$(X,24)=CHAR$ INT (ZX/2
25)
9940 LET F$(X,25)=CHR$ (ZX-CODE
F$(X,24)*256)
9950 NEXT X

```

```

9960 FOR X=1 TO 5
9970 LET ZX=CODE F$(X,24)*256
9980 LET ZX=ZX+CODE F$(X,25)
9990 PRINT X,ZX
9995 NEXT X

```



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CHRISTMAS GIFT SUGGESTIONS

CHRISTMAS BUYING GUIDE

Recently someone suggested that a gift-buying guide of Timex-Sinclair-related products would be a good idea for the December issue. I hesitated at first. After all there are literally thousands of products that could be considered, and no one could cover the whole range adequately. I gave it some thought and I consulted the Bill Moreland of Magic Castle Video in Columbus and a few other people. What follows is a list of several products that come highly recommended, but please bear in mind, that this is not intended to be an exhaustive list.

COMPUTERS

Obviously, the first consideration is: does the gift recipient have a Timex computer?

With the introduction of the TS1500, prices for the TS1000 will continue to drop. (Don't be surprised to see the price go under \$20 if the backlog of TS-1000's continues for a while.) It may then be in the price range most people would consider as a Christmas gift.

Actually having seen the new TS1500, I really cannot recommend the TS1000 too highly. The 1500 is what the original ZX81 and Timex 1000 should have been. The biggest (and often only) objection many people had to the ZX81 was the keyboard (or lack thereof). Can you imagine what would have happened in 1982 if Timex and Sinclair would have come out with the TS1500 for around \$100? Everyone would have bought one! The 1500 is internally identical to the 1000. Plus you get 16K RAM, a real keyboard, a sturdier case and a cartridge slot all for around \$80.

One product for anyone who has a TS-1000 or ZX81 without a separate keyboard, (recommended to me by Tracy Norris) is made by E.H. Enterprises, in Little Rock. They

make a set of stick-on keytops that are placed individually over the key locations on the Sinclair (or Timex) membrane keyboard, to simulate the feel of a real keyboard. Their address is P.O.Box 4068, Little Rock, AR 72214. Only \$5.95.

However Bill Moreland recommends the Filesixty overlay keyboard. It also comes with adhesive backing to stick on the membrane keyboard, but it is all one piece. The Filesixty keys actually "give" and produce a calculator-type feel. It is available from Magic Castle, 2386 Wellesley Lane, Columbus, OH 43221, and other dealers, for \$19.95.

Before I go to other accessories, I recommend the TS-2068 as a more expensive Christmas gift (See this issue's article on the 2068). While it is a very powerful computer, it also doubles as a video game machine at a price not much more than the "pure game machines."

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ACCESSORIES

A nice gift for serious programmers (no matter what computer they have, if they use cassette storage) is a supply of Loran computer-grade tape. They provide superior performance and come in 3, 5, 7½, 10-minute lengths, with a special over-write protection. They retail from \$1.95 to \$3.25. Another is the Headmaster Headcleaner, a "wet" system for cleaning audio cassette players. It is non-abrasive, and easy-to-use. (Recommended once per month). Retail for \$7.95. Both products are available from Magic Castle Video and from most computer and audio stores.

The Timex 16K memory pack for the TS1000 is notorious for its tendency to wobble during programming (which causes all kinds of problems). One solution, called "The Solution" is a special rubber ring that stabilizes the RAM pack. (Available only through Magic Castle Video for \$3.95).

SOFTWARE

ZX Pro/File written by Thomas Woods is said to be perhaps the best program available for the TS1000, and is highly recommended. I recommend it for people who are really serious about Timex programming. It comes with a 59-page book to guide you through the powerful features of this program. Available from Robotec, Inc., 59 C Street, Ampoint Industrial Park, Perryburg, OH 43551, for \$14.95 (Cheap.)

HARDWARE

A good hardware project for amateur solderers is the Hunter Non-Volatile RAM Kit. This is an excellent product. With the kit you can add from 2K to 8K CMOS RAM, in the so called "invisible" 8 to 16K region of computer memory. Extremely good instructions and materials, easy-to-build, and very useful for storing machine code. (See inside front cover for details.)

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A new book from Wayne Green, Inc., is a great resource for any TS1000 user. "Converting to Timex Sinclair BASIC" is an excellent manual of BASIC commands from virtually every BASIC dialect. It makes converting BASIC language programs almost a mechanical process. It's the most comprehensive treatment of the subject available. Wayne Green Books, Peterborough, NH 03458. \$14.95 plus \$1.50 shipping.

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Paul Donnelly had this to say in the April issue of Syntax:

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FEATURE

MATRIX/CURSOR INPUT

By: Bill Johnson

In any interactive computer program (i.e., one that requires the user to supply the computer with information at several times during program execution), far more time will be consumed waiting for the user to get the computer information than the user waiting for the computer to finish manipulating the data. Not only are we simply slower than the computers, but since the computer must have the correct data in order to generate the correct answer, inputs must always be checked and then re-checked in order to minimize the possibility of error. This "weak link", where information must pass from computer-to-user and user-to-computer, can be addressed in two ways. The first is through the use of such hardware as touch screens, "mouse" controllers, etc. But the most straightforward way to address the problem is through software. The user must be able to clearly understand what the computer is asking. This involves concise, readable questions or queries, and responses that require only a minimum number of key-strokes. Error recovery is another important partial solution to the problem of data input, one that we will deal with separately in a later article. But what we will address now is the question of how to get the most information on the screen, in a relatively simple and imageable format, in order for the person sitting at the computer to have the maximum understanding of not only what is being asked of him by the computer, but also what information the computer already has.

In most programming applications, data can be broken down into repetitive sets, similar in units of measure and other respects. To input each set of data, similar or identical sets of questions must be asked in order to prompt the inputs. When this

is the case, the twin problem of requesting information in a readable format and then displaying the received data in a readable format, can be solved by what I call Matrix/Cursor Input.

The idea is to map on the screen a set of headings at the top and side that outline an empty matrix into which you can input information. To prompt inputs, all one needs to do is to place a cursor (i.e. a question mark or inverse question mark) in the location on the screen corresponding to the row and column that define the information that the computer requires. After this information is read in from the keyboard, it can be printed in that same location, and the process repeated until the entire matrix is filled with information.

For example, in the screen copy below, each row holds a different type of information and each column holds a set of information describing a particular business trip.

(PRINT HEADING HERE...)

| | 1 | 2 | 3 |
|------------------|---|---|---|
| BUSINESS TRIP | | | |
| DESTINATION | | | |
| DATE(MO/DY) | | | |
| ODOMETER(1ST) | | | |
| ODOMETER(END) | | | |
| GASOLINE(\$\$\$) | | | |
| GASOLINE(GAL) | | | |

*TOT.MILEAGE=
*MILES/GAL. =
*AVG.\$/GAL. =

Using this concept, the data from three business trips can be requested, INPUT, and PRINTED on the screen with a minimum of changes in the screen--allowing maximum display of inputs in an easily examinable

format. This method makes it possible for you to check your entries a second time, after all the information has been read in, giving you a chance to see discrepancies between sets of data. Also, the more information you can get onto the screen at one time, the more control the user gains over the program and its data.

We will now briefly outline this concept and then go on to a detailed description of how to incorporate it into your programs.

OUTLINE OF PROCESS

1. PRINT a row/column format on the screen.
--Headings and titles: be sure to include units of measure and other important notes.
2. PRINT cursor (inverse question mark) in the correct row/column of the matrix.

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3. INPUT information (into an array)
4. PRINT information in its square (over the cursor).
5.PRINT cursor in the next square.

As a specific example of this format, we will now look at the input section of a program I have written to analyze the heat gain/heat loss of a building.

This particular portion of the program requests information describing the windows for a room in the house. Each window has a data set which describes its area, orientation, shading, etc. This program accepts up to four windows per room.

(PRINT HEADING HERE)

| CLASS | 1 | 2 | 3 | 4 |
|------------|------|-----|-----|-----|
| AREA(SQFT) | 1024 | 572 | 544 | 750 |
| DEG.HORIZ. | 90 | 90 | 75 | 90 |
| DEG.REF.< | 10 | 55 | 10 | -80 |
| OVERHANG | 24 | 24 | 0 | 24 |
| WINDOW HT. | 72 | 48 | 72 | 72 |
| HEAD TO OH | 8 | 8 | 0 | 8 |
| NO.GLAZNGS | 2 | 2 | 2 | 2 |

The cursor would begin in the upper left part of the matrix and continue down the column until the first window has been fully described. The program will then proceed to the second column, and so on.

Before we go on to a program listing, let's look closer at the outline given earlier and clarify some programming decisions.

1. PRINT a row/column format on the screen. This involves a decision as to what the length of the inputs will be (i.e. 0-9999, all integers, requires four characters as well as separating spaces), and whether the inputs would be in a row or column. I placed the

glass data in a column in this case because seven items would not fit in a single line.

2. PRINT a cursor in the correct cell. This requires you to set up two print position variables (x,y), one to indicate the row and one to specify the column. In setting up the glass data, we want to print our inputs on the fourth line, (row 3 in Sinclair display format) and the fourteenth column (#13 on the Sinclair). We will input seven consecutive items in the same column, and then proceed to a similar set of items five spaces to the right (the second column of data). Thus the printing locations are as follows (in the PRINT AT (row, column) format):

| | | | |
|--------|--------|--------|--------|
| (3,13) | (3,18) | (3,23) | (3,28) |
| (4,13) | (4,18) | (4,23) | (4,28) |
| . | . | . | . |
| . | . | . | . |
| (9,13) | (9,18) | (9,23) | (9,28) |

These are the row/column locations of each cell of the matrix that the program will have to generate.

3. INPUT information. This requires setting up an array that corresponds to the screen matrix that you have settled on. For clarity in this example, we will INPUT the glass data into a single, two-dimensional array of seven rows and four columns. But if the program were to accommodate several rooms (which my full heat loss/heat gain program does), it could be expanded to a three-dimensional array with the third dimension being the different rooms.
4. PRINT information over the cursor. Printing the data (using the same print position variables as in Step 2) will overwrite the cursor and fill the cell with data.

Listing

Rule of 1978 - Car Loan Payments

This program can be used to closely approximate the repayment schedule of a bank financed auto loan. Most banks use the "Rule of 1978" rather than the simple interest formula to calculate loan payments for cars. Even though the total amount of interest paid is the same in either case, in the "Rule of 1978" loan more of the interest is paid in the earlier payments and less in the latter payments, compared to a simple interest loan (i.e., in a simple interest loan the interest is figured on the unpaid balance). This rule was developed due to the rapid depreciation of new car values.

This program allows the option of printing to the ZX or TS 2040 printer, using LPRINT statements. For any time period over 14 months, the screen fills up and it is necessary to press CONTINUE, then ENTER. This can be avoided by adding line: 485 IF I > 15 THEN SCROLL.

The last number in the balance column gives an indication of the accuracy of the calculation. The smaller the absolute value of the number, the better the calculation.

Dollar Format Subroutine

Lines 900 through 990 of the "Rule of 1978" program comprise a dollar formatting subroutine that can be used in other business/financial programs. This routine converts the number represented by ZZ into the string Z\$ which contains exactly two decimal places (i.e., 117 is converted to 117.00 and 456.8352 is converted to 456.84.)

```

1 REM ***RULE OF 1978***
2 REM * INTEREST PAYMENT *
3 REM * P.C. SIMPSON *
4 REM ***T-S HORIZONS***
100 PRINT "RULE OF 1978"
110 PRINT "INTEREST PAYMENT"
120 PRINT "AMOUNT TO BE FINANCE
D?"
125 INPUT PU
130 PRINT PU,"YEARLY INT. RATE (
PERCENT)?"
135 INPUT YI
140 PRINT YI,"NUMBER OF MONTHS?"
142 INPUT N
144 PRINT N
145 LET PU=INT (PU*100)/100
146 LET MI=YI/1200
150 LET D=N*(N+1)/2
160 LET PM=PU/((1-(1+MI)**-N)/M
I)
165 LET ZZ=PM
170 GOSUB 900
175 LET D$=Z$
180 LET AP=N*VAL D$
200 LET IC=0
210 LET IT=AP-PU
220 LET BL=PU
250 PRINT "DO YOU WANT A PRINT
OUT?(Y/N)"
260 INPUT A$
270 IF A$="Y" THEN GOTO 310
280 IF A$="N" THEN GOTO 400
290 GOTO 260
300 FAST
310 LPRINT TAB 9;"P.C. SIMPSON"
320 LPRINT TAB 7;"INTEREST PAYMENT"
330 LPRINT "AMOUNT TO BE FINA
NCED ="PU
340 LPRINT "YEARLY INT. RATE (PE
RCENT) ="YI
350 LPRINT "NUMBER OF MONTHS
 ="N
360 LPRINT "MONTH PAYMENT INTE
REST BALANCE"
400 PRINT "MONTH PAYMENT INTER
EST BALANCE"
410 FOR I=1 TO N
430 LET IM=(N+1-I)/D*IT
432 LET ZZ=IM
434 GOSUB 900
436 LET I$=Z$
438 LET IM=VAL I$
440 LET BL=BL-PM+IM
450 LET ZZ=BL
460 GOSUB 900
465 LET B$=Z$
470 LET IC=IC+IM
480 PRINT TAB 1;I;TAB 3;D$;" ";
I$;" ";B$
490 IF A$="Y" THEN LPRINT TAB 1
;I;TAB 3;D$;" ";I$;" ";B$
500 NEXT I
510 LET ZZ=IC
512 GOSUB 900
514 LET I$=Z$
516 LET ZZ=AP
518 GOSUB 900
520 PRINT "SUM";Z$;" ";I$
530 IF A$="Y" THEN LPRINT "TOTA
L";Z$;I$
550 PRINT "DO YOU WISH TO REPEA
T?(Y/N)"
560 INPUT A$
570 IF A$="Y" THEN GOTO 120
580 IF A$(">")="N" THEN GOTO 550
600 STOP
609 REM ROUTINE-FORMAT DOLLARS
900 LET Z$=""
((ZZ+.005)*100)/100)
910 FOR X=1 TO LEN Z$
920 IF Z$(X)="." THEN GOTO 960
930 NEXT X
940 LET Z$=Z$+".00"
950 GOTO 980
960 IF LEN Z$-X=0 THEN LET Z$=Z
$+"00"
970 IF LEN Z$-X=1 THEN LET Z$=Z
$+"0"
980 LET Z$=Z$(LEN Z$-8 TO )
990 RETURN

```


RULE OF 1975 INTEREST PAYMENT

| | | | |
|---------------------------------|---------|----------|---------|
| AMOUNT TO BE FINANCED = 6000 | | | |
| YEARLY INT. RATE (PERCENT) = 15 | | | |
| NUMBER OF MONTHS = 36 | | | |
| MONTH | PAYMENT | INTEREST | BALANCE |
| 1 | 2007.00 | 80.41 | 5872.42 |
| 2 | 2007.00 | 78.18 | 5742.61 |
| 3 | 2007.00 | 75.95 | 5610.56 |
| 4 | 2007.00 | 73.71 | 5476.28 |
| 5 | 2007.00 | 71.48 | 5339.77 |
| 6 | 2007.00 | 69.24 | 5201.02 |
| 7 | 2007.00 | 67.01 | 5060.04 |
| 8 | 2007.00 | 64.78 | 4916.80 |
| 9 | 2007.00 | 62.54 | 4771.37 |
| 10 | 2007.00 | 60.31 | 4623.80 |
| 11 | 2007.00 | 58.08 | 4473.98 |
| 12 | 2007.00 | 55.84 | 4321.63 |
| 13 | 2007.00 | 53.61 | 4167.04 |
| 14 | 2007.00 | 51.37 | 4010.10 |
| 15 | 2007.00 | 49.14 | 3851.10 |
| 16 | 2007.00 | 46.91 | 3689.98 |
| 17 | 2007.00 | 44.67 | 3526.51 |
| 18 | 2007.00 | 42.44 | 3360.54 |
| 19 | 2007.00 | 40.21 | 3192.04 |
| 20 | 2007.00 | 37.97 | 3020.80 |
| 21 | 2007.00 | 35.74 | 2846.51 |
| 22 | 2007.00 | 33.51 | 2668.80 |
| 23 | 2007.00 | 31.27 | 2487.24 |
| 24 | 2007.00 | 29.04 | 2302.30 |
| 25 | 2007.00 | 26.81 | 2113.40 |
| 26 | 2007.00 | 24.58 | 1920.02 |
| 27 | 2007.00 | 22.34 | 1722.48 |
| 28 | 2007.00 | 20.11 | 1520.00 |
| 29 | 2007.00 | 17.88 | 1312.02 |
| 30 | 2007.00 | 15.64 | 1100.04 |
| 31 | 2007.00 | 13.41 | 882.51 |
| 32 | 2007.00 | 11.18 | 659.80 |
| 33 | 2007.00 | 8.95 | 431.30 |
| 34 | 2007.00 | 6.71 | 197.24 |
| 35 | 2007.00 | 4.47 | 152.30 |
| 36 | 2007.00 | 2.23 | 100.00 |
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PROGRAM **Tips**

User-Friendly?

By: Bill Johnson

(Editor's Note: This column is intended to present tips on clear, concise, "user-friendly" programming.)

One of the simplest programming tricks that can be utilized on the TS 1000/ZX-81 to make your programs "user-friendly" involves a BASIC statement that is a powerful one yet poorly defined and never thoroughly explained in the manual. It is the INKEY\$ statement, and I doubt whether most ZX-81 owners have used it outside of game programming, if at all. The statement, when encountered in a program, scans the keyboard momentarily to see if any keys

have been depressed. If so, the key is stored in the proscribed variable and if not, the variable remains unchanged. At any rate, the scan does not wait either for a response, or the ENTER key, as the INPUT statement does.

In trying to write programs that are user-friendly, the INKEY\$ statement can be used in two ways; first to eliminate some unnecessary keystrokes, and secondly to screen out accidental entries. This method is particularly appropriate when the number of keystrokes can be cut down to one, such as yes or no response ("Y" or "N") or a single symbol input. The way to make it work is to get the computer to continue scanning the keyboard until a particular key is depressed. The following example illustrates a yes/no input, with the program continuing if yes, branching to line 1000 if no, and ignoring all other inputs.

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```
10 REM "INPUT ROUTINE"  
20 LET I$ = INKEY$  
30 IF I$ = "N" THEN GOTO 1000  
40 IF I$ <> "Y" THEN GOTO 20  
50 PRINT "YES"  
60 STOP  
1000 PRINT "NO"  
1010 STOP
```

As you can see, the program will continue to loop through lines 20, 30 and 40 until one of the two required keys is depressed. With a little imagination, you can modify the program to accept a series of single-keystroke entries.

ERROR CODES - November issue.

Page 14, column 2, "Patriotic Program"
Should read "Line 10: 25 grey squares."
"Line 20: 25 squares - gray
on top, white on bottom."

HARDWARE **Hints**

REVIEWS FOR THE NON-PROGRAMMER

A. Gindin

Sure, we bought the Sinclair because it was cheap. Then we read that it could do anything a "real" computer could do if we would just write the program in machine language. Unfortunately for some of us, any foreign language, e.g. German or BASIC, is more than we can handle. For us the computer should be a device to do things faster and better and not an exercise in frustration. The problem then is to get a configuration (hardware) and program (software) to carry out those aims.

If this is your problem also I would suggest that one of your first purchases be a Hunter Board. This is a memory board that uses the 8-16K memory addresses and enables you to use the fast-load system. (Write for it at this address: 1630 Forest Hills Drive, Okemos, Michigan, 48864). Another item, I would consider is a Z-XLR8*. (Ac-cel-er-ate, get it?) This is the fast load system that will work together with the Hunter board. This combination will overcome what I consider to be the worst working feature of the Sinclair: the interminable slow loads and saves. Obviously another solution would be to buy a Timex 2068, but you would not get the versatility of the Hunter system or the numeric keyboard (to be discussed at a later date).

The EPROM of Z-XLR8 mounts in slot 4 (14-16K) of the Hunter board and is always ready to go. Any software you have for the computer (so far I've used it only with 16K memory which of course loads into the 16 - 32K memory area) will load/save in seconds, and I rarely ever check now for a good save. The Z-XLR8 permits such esoteric functions as Graphics Save (of the screen), Data Save (of an array in storage), and Binary Save (of any number of contiguous bytes). It also gives a visible index of what's on the tape and the number of bytes

of each program. It can be mounted directly on the Sinclair board, but I prefer not to alter the board directly. Some programs require you to enter SLOW after entry to get the program to run properly.

The Hunter Board** holds a total of 4 CMOS and/or EPROM chips. It comes as a kit, or complete if you don't like to solder. It is one of the most professionally produced electronic kits I have ever seen (of Heath, EICO, etc.). Additional CMOS chips are available from Hunter or from other suppliers (slightly cheaper). The documentation is beautiful. In addition to clear directions for construction there are programs to save the screen, reload from memory, generate a REM statement, merging programs, and bytes of free memory. The board can also be used as RAM.

Next month we will deal with crashes, printing, and hopefully some useful programs.

* From Advanced Interface Designs, Box 1350, State College, PA 16801.

HINT: Rubbing a few drops of motor oil onto the case of your ZX81 or TS1000 will really make it look glossy. Also a few drops of oil on the edge connector will prevent the contacts from oxidizing. Fewer crashes!

HINT: A cheap, quick addition to your TV monitor is to take a yellow document protector and a red document protector, put them together and tape over your TV screen. Viola! A cheap amber monitor. Suggested by Sonny Cline of Jasper, Indiana.



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- The Elusive Mr. Big

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This month I want to review "The Elusive Mr. Big." For all you masterminds out there, you'd better be good detectives. This game is a lot like "Quest for the Holy Grail" (which I reviewed last time) except it happens in the city instead of the jungle, and you have a shorter time limit.

This is how the game starts. You are sitting in your detective office and the phone rings. It's a dame. She gives you some information about Mr. Big and you have to go to New York to catch him. But you have to be careful because you have to ask people questions and they may lie. You can pick up certain objects like bandages, knives, and a bullet-proof vest to protect yourself, but you can only carry five things.

This game has all the same commands as "Quest for the Holy Grail" plus SEARCH (North, East, South, West) for the criminal, STUDY clues, and USE FORCE to subdue criminal.

If you find the criminal you should be very careful since he is very dangerous and you could be killed.

See you in the next issue.

Jason Setters


KIDS PAGE



HOW TO USE GRAPHICS Part 1

If you look up the word GRAPHICS in the dictionary it says that graphics means drawing pictures. When a person uses a COMPUTER to draw pictures it is called COMPUTER GRAPHICS. Every kind of computer has a different way to draw graphics.


The TS1000 or ZX81 computer has a special way to draw graphics, by using little BLOCKS. When you put the blocks together a certain way, you can make pictures. The key called GRAPHICS (which is the key that the number 9 is on), is used to make the BLOCKS.

The easiest way to make a picture with the blocks is to line the blocks up in a row across the screen. For our first picture, let's try to draw an easy picture of a toothbrush.



```
10 LET A$="  "  
20 PRINT A$
```

Here's how to type in the picture in line 10. After you type the quote marks (") then press SHIFT and GRAPHICS (on the 9-key) at the same time. This makes the computer ready for the graphics blocks. Then press SHIFT and 6, and it will make the following block . Press SHIFT-6 two more times. Then press SHIFT-F. That will make the following block . Last of all press SHIFT-GRAPHICS again (this tells the computer to QUIT using the graphics blocks). Then type the last quote marks. Now anytime you run this program it will draw a toothbrush with a black handle.

Now I admit that a picture of a toothbrush isn't all that great. But that's just the beginning! Another thing we can draw all on one line is a snake! Like in the next program.

```
30 LET B$="  "  
40 PRINT B$
```



To type in the snake from line 30, press SHIFT-GRAPHICS, then press SHIFT-D, SHIFT-Q, SHIFT-R, SHIFT-6, SHIFT-E, SHIFT-W, SHIFT-6, the letter o (without the SHIFT) and then press SHIFT-6 again. Press SHIFT-GRAPHICS again to go back to regular letters. (Don't forget to put quotes around the snake.)

Some other one-line pictures you can draw are a caterpillar  (SHIFT-GRAPHICS, SHIFT-X, the SHIFT-R five times), or a pencil  (SHIFT-GRAPHICS, SPACE (without SHIFT), SHIFT A, SHIFT-L five times, then SHIFT-GRAPHICS again and SHIFT-M).

You don't even need SHIFT-GRAPHICS for some pictures, like this arrow >----->. To make it just type SHIFT-M, SHIFT-J five times, and SHIFT-M again.

If you use your imagination, you can think of other one-line graphics. If you think of any good ones, you can send them to KIDS' PAGE, 2002 Summit Street, Portsmouth, Ohio 45662. Next time we will talk about more graphics. Until then here's a program to use the snake graphics, called SNEAKY SNAKE. Just type in any short message and SNEAKY will spell it with his tail.

```

10 REM SNEAKY
20 PRINT "ENTER ANY MESSAGE AND
D SNEAKY SNAKE WILL SP
ELL IT OUT."
30 INPUT A$
40 FOR L=1 TO LEN A$
50 PRINT AT 7,L-1;A$(L);"
60 NEXT L
70 STOP

```

ENTER ANY MESSAGE AND
SNEAKY SNAKE WILL SPELL IT OUT.

HELLO. I AM SNEAKY.

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MATRIX INVERSION USING GAUSS-JORDAN ELIMINATION

By: K.D. Lewis

The inverse of a square matrix C is defined by the matrix equation

$$CC^{-1} = C^{-1}C = I$$

where C^{-1} is the inverse of C, and I is the identity matrix, for example

$$I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \text{ when C is a 3x3 matrix.}$$

The matrix C^{-1} exists if and only if C is nonsingular, i.e., if the determinant of $C \neq 0$.

One approach to finding C^{-1} , is to consider the matrix equation

$$CC^{-1} = I \quad (1)$$

and apply a series of elementary row operations to C on the left hand side of the equation and simultaneously to I on the right hand side, with the objective of transforming the C matrix into I. Ultimately, the left hand side of the C matrix equation (1) then becomes IC^{-1} , or simply C^{-1} .

These same operations must transform I on the right hand side of equation (1) into C^{-1} in order to preserve the equality. Thus equation (1) eventually becomes.

$$IC^{-1} = C^{-1} \quad (2)$$

This is the Gauss Jordan elimination method.

The Program

The program given here uses the ideas above, and in addition employs several techniques for maximizing pivot elements in

pivot rows and columns. In order to save storage space, the input matrix C is overwritten by the inverted matrix C^{-1} (i.e., the original matrix C is destroyed). The program has no error exits, and if a singular matrix is entered, erroneous results are returned. Within the program however a "feasibility index" is computed, and an extremely small feasibility index is usually indicative of a singularity in which case, the matrix has no true inverse.

To run the program, the user must respond to the prompt "INPUT DIMENSION N" by entering N, the dimension of the square matrix C to be inverted, and to the prompt "INPUT C-MATRIX", by entering the C matrix by rows, i.e., $a_{11}, a_{12}, a_{13} \dots a_{1n}, a_{21}, a_{22}, a_{23} \dots a_{nn}$.

Example

Invert the matrix $C = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{pmatrix}$

When A is substituted into equation (1) we get

$$\begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{pmatrix} C^{-1} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

The program will prompt: "INPUT DIMENSION N." Since we have a 3x3 matrix, enter "3". The next prompt is "INPUT C-MATRIX." Now the C-matrix is entered as 2, 1, 1, 1, 2, 1, 1, 1, 2.

The final results are printed out as .75000, -.25000, -.25000, -.25000, .75000, -.25000, -.25000, .75000.

(Editor's note): Ken's future articles will feature: Numerical integration of continuous functions using the Trapezoid Rule and Simpson's Rule.

Statistics package, including mean, mode, median and standard deviation computation from point input.

Jacobi Method for simultaneous computation of eigenvectors and eigenvalues.

USING THE ZX81 AS AN INSTRUMENT CONTROLLER

A Review By: Ed Simpson and Rick Duncan

The extent to which the Sinclair computer has been utilized as a controller in industrial, business and scientific applications may surprise some people. One of the main reasons for its use is its low cost. To control various instruments and appliances, all that is needed is an interface device to translate the electrical input/output signals of the ZX81 to the signals used by the device to be controlled.

The February 1983 issue of American Laboratory (Vol. 15, No. 2) features an article by Dean Webster, a graduate chemistry student at the Virginia Polytechnic Institute. Mr. Webster built an interface which allows the Sinclair to control a Fisher Titrimeter system. The result is an inexpensive method to perform titrations, which, of course, provides a savings in manpower.

Mr. Webster writes:

"The Sinclair ZX81, despite its deceptively simple appearance offers attractive possibilities for use as an inexpensive...instrument controller. The ZX81 contains a powerful Z80 8-bit microprocessor and has a sophisticated built-in BASIC. The Z80 bus is also conveniently located at the rear of the computer."

Mr. Webster goes on to describe the Fisher titration system for which the ZX81 acted as a controller. He also presents schematic diagrams, flow charts, and "a description of the pitfalls encountered (in order to) save others time and confusion in constructing" such a system. His combined cost including a black and white television, ZX81 with 16K RAM, and interfacing components came to around \$350.

This article may be a valuable reference for anyone wanting to use a Sinclair-type computer as a controller in other scientific and industrial usages.

```

100 REM MATINU
120 REM THIS PROGRAM INVERTS
130 REM INPUT MATRIX C
200 DIM C(15,15)
300 DIM J(40)
400 PRINT "INPUT DIMENSION N"
500 INPUT N
600 PRINT "INPUT C-MATRIX"
700 FOR I=1 TO N
800 FOR J=1 TO N
900 INPUT C(I,J)
1000 NEXT J
1100 NEXT I
1200 LET PD=1
1300 FOR L=1 TO N
1400 LET DD=0
1500 FOR K=1 TO N
1600 LET DD=DD+C(L,K)*C(L,K)
1700 NEXT K
1800 LET DD=50R(DD)
1900 NEXT L
2000 LET DETH=1
2100 FOR L=1 TO N
2200 LET J(L+20)=L
2300 NEXT L
2400 FOR L=1 TO N
2500 LET CC=0
2600 LET M=L
2700 FOR K=L TO N
2800 IF (ABS(CC)-ABS(C(L,K))) > 0 THEN GOTO 3100
2900 LET M=K
3000 LET CC=C(L,K)
3100 NEXT K
3200 IF (L=M) THEN GOTO 4100
3300 LET K=J(M+20)
3400 LET J(M+20)=J(L+20)
3500 LET J(L+20)=K
3600 FOR K=1 TO N
3700 LET S=C(K,L)
3800 LET C(K,L)=C(K,M)
3900 LET C(K,M)=S
4000 NEXT K
4100 LET C(L,L)=1
4200 LET DETH=DETH*CC
4300 FOR M=1 TO N
4400 LET C(L,M)=C(L,M)/CC
4500 NEXT M
4600 FOR M=1 TO N
4700 IF L=M THEN GOTO 5400
4800 LET CC=C(M,L)
4900 IF (CC=0) THEN GOTO 5400
5000 LET C(M,L)=0
5100 FOR K=1 TO N
5200 LET C(M,K)=C(M,K)-CC*C(L,K)
5300 NEXT K
5400 NEXT M
5500 NEXT L
5600 FOR L=1 TO N
5700 IF (J(L+20)=L) THEN GOTO 5800
5800 LET M=L
5900 LET M=M+1
6000 IF (J(M+20)=L) THEN GOTO 5100
6100 IF (N>M) THEN GOTO 5800
6200 LET J(M+20)=J(L+20)
6300 FOR K=1 TO N
6400 LET CC=C(L,K)
6500 LET C(L,K)=C(M,K)
6600 LET C(M,K)=CC
6700 NEXT K
6800 LET J(L+20)=L
6900 NEXT L
7000 LET DETH=ABS(DETH)
7100 LET DTNRM=DETH/PO
7200 PRINT "THE FEASIBILITY INDEX"
7300 FOR I=1 TO N
7400 FOR J=1 TO N
7500 PRINT C(I,J)
7600 NEXT J
7700 NEXT I
7800 STOP

```

BOOK REVIEW

By: Rick Duncan
The Sinclair ZX81
Dilithium Press
8285 SW Nimbus, Suite 151
Beaverton, OR 97005
\$11.95 (\$24.95 with
cassette)



"The Sinclair ZX81 - Programming for Real Applications," may not be the most recent book written for the ZX81 and TS1000 computers, but it is instructive and well-written, and would make a fine addition to anyone's Timex-Sinclair-related library. The book is intended for the new user who is ready to go beyond the Sinclair manual, yet it has material of interest to more experienced programmers as well. The author, Randie Hurley, covers a range of several practical applications including word processing, bulk data storage, test scoring and analysis and financial applications. The program listings are presented interspersed with text and are extensively documented. All the programs (which are available on tape) require 16K RAM.

However before presenting the applications, Hurley spends two chapters on an excellent discussion of programming techniques. Chapter 2 begins with a succinct introduction to flow charting. (All the major programs are accompanied by flow charts.) The chapter also provides routines for input checking, auto start-up and crash protection. Program de-bugging and a "dry-run" technique are also discussed.

Chapter 3, Saving Time and Space, begins with a comparison of integer, decimal, and binary number manipulation as an introduction to a discussion of memory-saving techniques and running and loading time saving techniques.

The Word Juggler (Chapter 4) is a menu-driven mini-word processor, complete with cursor controls (on the arrow keys), and limited delete, correct, and insert capabilities. The program is in BASIC (as are all the programs in the book), and takes about 3.5K of memory, leaving room for approximately 2000 words. There is an optional "readability calculator" which computes the reading difficulty of the text by paragraph. This subroutine is valuable for teachers and others who need to gear their work to a particular age group or intellectual level. The Word Juggler is written for use with the 32-column ZX (thus TS 2040) printer.

Chapters 5 through 7 contain programs and subroutines for financial applications, including a bill payment/checkbook balancer, a dollar (or pound) format subroutine, and a bank program. The latter is a program developed by Mr. Hurley for use at a "student bank" in a school where he teaches in England. It can handle 200 accounts and handles various transactions, opens and closes accounts, calculates earned interest, and does general accounting.

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**MAGIC
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Chapter 8 discusses a clever technique for the bulk storage of large amounts of data.

Chapters 9 and 10 have teacher aids like a "Rank Order" program to rank students by test scores, and a Exam Result Analyzer to evaluate test scores by overall performance, individual subjects, random samples and other considerations.

Hardware Modifications, Chapter 11, seems oddly out-of-place in this programming book. Two of the projects are obsolete, dealing with the ZX80 and the ZX81 kit. The third is on linking a "normal keyboard" to the ZX81, and provides several helpful hints for doing so.

The book does what it is intended to do, which is to take the Sinclair user beyond the owner's manual, and mostly to offer real world applications for the ZX81. Hurley's eclectic writing style gives the book a comfortable feel.

Partial Pascal

Bring Tape Under Control

Partial Pascal makes tape easier and more convenient to use. The *write* statement in your Partial Pascal program stores output to tape in buffers in RAM. When a buffer is full (or when your program indicates it has no more data to write). Partial Pascal asks what name you want to give it and records a header, the name you specify and the data from the buffer, releasing it to be refilled with more data from your program. The header recorded by Partial Pascal, unlike a "header" consisting of silence, allows the automatic level control on most cassette recorders to stabilize before the name and data are recorded, improving reliability when the tape is read.

Partial Pascal is not fussy at all about positioning the tape for input. Anywhere before the header of the file to be read in will do, including in the middle of earlier recordings. Partial Pascal keeps you informed of what it's reading. If it comes to a header with a name other than the one you've asked for, Partial Pascal shows you the name it has found and continues searching the tape. This makes it easy to rediscover, if necessary, all the names you've used on a tape. If you've typed in the wrong name, press the space key and Partial Pascal will ask you to respecify the name.

The Partial Pascal programming package includes full-screen editor, co-resident compiler, run-time interpreter, utility library, example programs and user manual. 16K ZX81, Timex Sinclair 1000 or Timex Sinclair 1500 required. \$30 postpaid from

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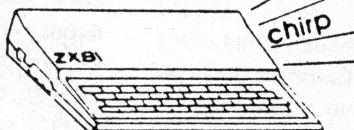
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SIMPLE RESET SWITCH

By: William Cline, Jr.

One of the noted short-comings of the TIMEX-SINCLAIR TS1000/ZX81 is the lack of an "off-on" switch. I've found that adding a simple "reset" switch to the computer gives me the same end result as an "off-on" line power switch and it has the added benefit of less wear and tear on the power input jack.

Adding a "reset" switch is really one of the simplest and most inexpensive (read cheap) first additions an owner can make to his computer.

In any modifications I give instructions for, I usually specify Radio Shack catalog numbers simply because Radio Shack outlets are accessible to more people than other national suppliers. The fact is that there are a lot of first-time computer owners that will feel more comfortable with specific part numbers, supply sources, and simple instructions. Let's face the fact that not everyone who owns a computer can make successful hardware modifications using "paper clips and alligator clips." I will try to make all my instructions as "goof-proof" as possible but remember I can't be responsible for any damages to your machine.

PROCEDURE

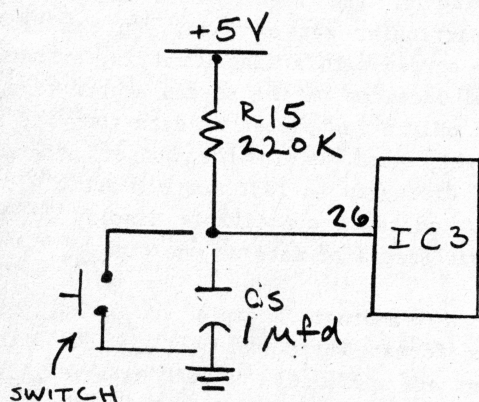
First disconnect all cables from the unit and turn it over. Next remove the three rubber pads covering three of the five case screws. I usually just stick them to the case toward the center so I don't lose them. Otherwise they get dirty and won't restick.

Now remove the five screws that you can see; be sure to use a good phillips-headed screwdriver since you will be removing and re-installing these same screws many times as you modify your computer. Remove the

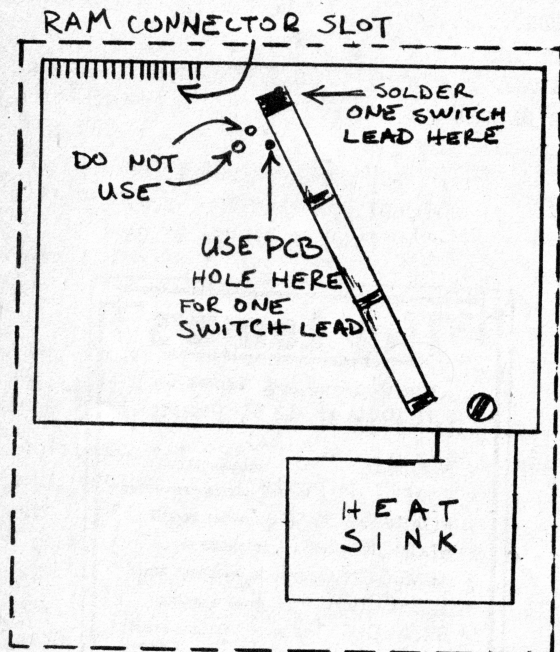
cover and set it aside. I place the removed screws in the turned-up case to keep track of them.

Now while looking at the bottom side of the PCB, you will see the raised metal strip going diagonally across the PCB. Apply a soldering iron to the end nearest the RAM expansion edge connector while giving a slight upward pull with a pair of needle-nose pliers; in a few seconds the end will come free. Lift the free end gently and brace it up out of the way (I used a flat rubber eraser). Now you should have a view as in figure 1. Set the unit aside and prepare your switch. I used the Radio Shack catalog no. 275-1547 which comes five to a package. It is a Mini SPST NO (normally open) momentary contact with solder lugs. Prepare two 2-inch lengths of wire (R/S Cat. No. 278-1307-package of 3 color); it is best to use two different colors for later identification. Solder the wires to the switch; prepare the wires to mount into the PCB. Note at this point the more experienced builder will probably take out the two PCB screws and carefully move the PCB out of the way to drill and mount the switch in the rear of the case. If you do this be careful to avoid hitting any of the PCB components and make sure you don't pull out the flat keyboard cables. After you have decided on mounting or not mounting the switch proceed to the actual solder attachment to the PCB. Refer to figure 1. Solder one of the wires to the indicated point (it doesn't matter which wire is used). Be neat and clean. If you have used #22 wire it should fit in the PCB hole easily. Now remove the rubber eraser letting the metal strip again rest on its original mounting pad. Place the remaining wire lead on the strip and resolder the connection. Replace the bottom half of the case. Plug in the computer and fire it up. A cursor should appear as normal (If it doesn't, remove the bottom and check to see if you have loosened the keyboard flat cable). Now press the switch. The cursor

should disappear for a few seconds and reappear after the computer has reset all the registers to zero and run its internal RAM check routine. There it is: two simple solder connections and you have a useful addition to your computer.



SCHEMATIC



BOTTOM VIEW

FIG. 1

5. PRINT cursor in the next cell. This will mean reaching the end of the program loop and starting the cycle over again.

The following is a listing of the input portion of the heat loss/heat gain program that will set-up and read-in the glass data in that screen format previously shown. It sets up a seven-row, four-column matrix and reads information into it. For your information, the variables are explained following the listing.

LISTING

```

4000 REM MATRIX/CURSOR INPUT
4050 DIM I(4,7)
4060 LET Y=8
4080 PRINT AT 0,0;"(PRINT HEADING HERE)"
4090 PRINT AT 2,0;"NO.OF GLASS AREAS?"
4095 INPUT NO
4100 IF NO>4 THEN GOTO 4090
4105 PRINT AT 2,0;" GLASS"
4110 PRINT AT 4,0;"AREA (SQFT)"
4115 PRINT "DEG.HORIZ."
4120 PRINT "DEG.REF.<"
4125 PRINT "OVERHANG"
4130 PRINT "WINDOW HT."
4135 PRINT "HEAD TO OH"
4140 PRINT "NO.GLAZNGS"
4150 FOR N=1 TO NO
4155 LET Y=Y+5
4160 PRINT AT 2,Y,N
4165 FOR X=1 TO 7
4170 PRINT AT X+3,Y;"  "
4175 PRINT AT X+3,Y;"?"
4180 INPUT I(N,X)
4182 LET I(N,X)=INT I(N,X)
4185 IF I(N,X)>=1000 THEN GOTO 4170
4190 PRINT AT X+3,Y;I(N,X)
4195 NEXT X
4200 NEXT N

```

VARIABLES

- I(4,7) - array that stores all glass data
- Y - print position variable that indicates column
- X - loop variable and print position variable that indicates row

Continued from Page 11

NO - no. of glass areas (1-4)
N - loop variable, indicating which column is operating

Remarks on the program listing

line 4050: define the array sufficiently large to store all of the requisite data. Re-dimensioning will wipe-out all existing data and you will have to start over.

line 4060: since the print locations that we seek are at y=13,18,23 and 28, we begin with y=8 and add 5 at the beginning of each loop (line 4155).

lines 4080-4100: these lines print a title and ask how many glass areas there are in order to set up the number of columns in the matrix.

lines 4110-4140: these statements print cryptic headings down the left side of the screen to define the type of data in each row.

line 4150: set up loop to go from column to column.

line 4155: increment variable (Y) to the correct value.

line 4160: print at the top of the column the number (1-4) of each glass area.

line 4165: set up loop to go down seven rows of data.

line 4170: blank out anything that was in the cell (this becomes important in conjunction with error recovery).

line 4175: print cursor (?) in the cell to indicate data to be input.

line 4180: input data into the corresponding cell of the array.

lines 4182,4185: limit inputs to four-digit integers.

line 4190: print data in its cell.

line 4195: bottom of X loop (7 rows).

line 4200: bottom of N loop (1-4 columns).

Depending on the requirements imposed by your particular set of data, you can fill up the screen with a single matrix, or have several matrices on the screen at one time. And if only a few pieces of data comprise a data set, such as in the budget program that I discussed in last month's article on files, you could conceivably display 15 to 20 lines (sets) of data at one time.

Below is another example of using the matrix format, where not all of the data columns are applicable to each data set.

SURFACE TYPE: "BRIC" (1)

| MATERIAL | R/IN | IN THK | R-VAL |
|----------------------|------|--------|-------|
| OUTSIDE AIRFILM..... | | | 0.14 |
| BRIC | 0.11 | 4 | 0.44 |
| PLYWOOD | 1.25 | 0.625 | 0.78 |
| STUDS..... | | 3.5 | 0. |
| BATT INS | 3.2 | 3.5 | 11.2 |
| DRYWALL | 0.85 | 0.5 | 0.42 |
| INSIDE AIRFILM..... | | | 0.68 |

NOMINAL R-VALUE= 13.66
ADJUST.FOR FRAMING= -2.27
TOTAL R-VALUE= 11.39

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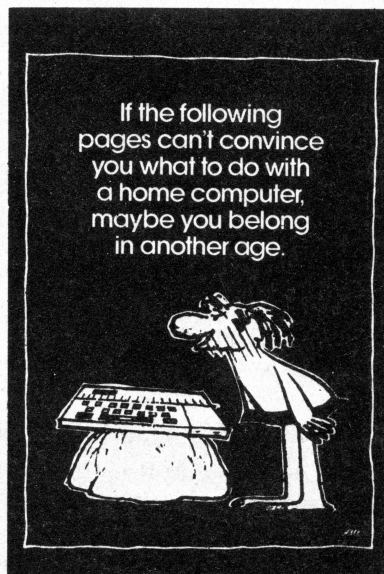
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Solvang, CA 93463

T-S NEWS

ITEM: The December issue of DISCOVER, and presumably other magazines, has an 8-page booklet from TIMEX with the comic strip character B.C. introducing the TS2068 and the following peripherals: TS2040 32-column thermal printer (\$99.95, nothing new), TS2050 Modem (\$119.95, no mention whether it is TS1000-compatible), TS2020 Program Recorder (\$49.95, cassette recorder), TS2090 Command Stick (\$14.95 each, game controller). Some of the software touted in the booklet are an auto mechanic program, foreign language teaching, IRA interest, flight simulation, drag race, spelling, astronomy, solar heating, and spelling. The hardware is available from Timex Computer Corp., P.O.Box 3138, Wallingford, CT 06492. (Add \$5.00 handling; TS2068 price is \$199.95.)



If the following
pages can't convince
you what to do with
a home computer,
maybe you belong
in another age.

ITEM: The Timex Sinclair Amateur Radio Users Group is made up of computer users who are interested in putting their Timex or Sinclair computers to use in amateur radio operations. Most of the members are not computer experts, and most but not all are licensed by the Federal Communications Commission to operate in the amateur radio service.

The group publishes a journal called QZX, which is the main benefit of membership. It is sent monthly by first class mail to all members. Membership is \$12 per year (with a \$7 surcharge for members who live outside of the United States, Canada, and Mexico). The journal publishes complete programs and hardware projects submitted by members. The journal also publishes personal items about the members and information about operating events such as nets in which the members might be interested.

Those who wish to join (and they need not be licensed amateurs) can do so by sending \$12 dues to Alex. F. Burr, K5XY; 2025 O'Donnell Drive; Las Cruces, NM, 88001.

ITEM: Hawg Wild Software recently announced a new set of programs for amateur radio enthusiasts. The programs are called the "Ham-Hacker" series. The series includes:

- Morse code (16K). Code practice with built-in audio tone. \$14.95
- MiniMUF 3.5. A maximum usable frequency radio propagation program. \$17.95
- CE Amp - Common Emitter Amplifier design/test program. \$19.95

Prices are discounted 10% until December 15, 1983. Available from Hawg Wild, P.O.Box 7668, Little Rock, AR 72217.

ITEM: Just got our new 32-page catalog from E. Arthur Brown. They sell all the Timex hardware, all Memotech products, Basicare products, and others. And they sell their own line of MKIV peripherals including a keyboard (with optional numerical keypad), a modem, keyboard overlays, and 16K and 64K memories. They have tried to select an assortment of peripherals with maximum compatibility with other products. The catalog is attractive and informative. Available from: E. Arthur Brown Co., 1702 Oak Knoll Drive, Alexandria, MN 56308.

ITEM: TIMEX has a hotline for Timex users. Just dial their toll free number 1-800-24-TIMEX and (if you can get through) the Timex Technical Support Group will provide a quick answer to your hardware or software questions. Monday thru Friday, 8AM to 8PM, ET.

ITEM: TIMEX also has a personal computer club. Members receive an official newsletter filled with creative programming ideas and early notice of new products. Write to Timex Personal Computer Club, Timex Computer Corporation, Waterbury, CT 06725.

ITEM: In England, Sinclair Research has unveiled a compact, continuous loop tape-drive and interface for the Spectrum called the ZX Microdrive. The approximately 1½ inch-wide tape cartridge has an 85K capacity and an average access time of 3½ seconds. The tape drive requires a \$50.00 interface unit but the interface can handle up to eight drives. (The drives are \$75.00 each.) The interface has an RS-232 port and a local-area network port. It is expected to be marketed in the U.S. for the Timex 2068. Sinclair Research, Ltd., 23 Motcomb Street, London, England SW1X 8LB.

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The computer industry is filled with success stories in which people have soared to great profits in a short period of time. The book's author, Ed Simpson, started his computerized mail list service and was reaping profits in 3 short months. This book reveals the secrets he and others used to obtain fast, high profit growth. You can apply these same techniques and watch your business expand.

NO EXPERIENCE NECESSARY

You do not need to be a computer expert to make money in this industry. The author himself had no previous computer knowledge before starting his successful business. Often you do not even need to own a computer and can start with a very small investment! This book does not stop with the descriptions of microcomputer based businesses but also reveals the marketing techniques so vitally necessary for you to succeed.

CONTENTS

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Sinclair-Vision?

If you're reading this magazine, you've probably heard of Sir Clive Sinclair. It was Sinclair who created the ZX80 and its successors the ZX81, TS1000, TS1500, Spectrum, and TS2048. He made it affordable for many people to buy a real computer, and a whole industry has sprung up around the 2 million Sinclair computers sold. You may not know that Sir Clive has also been working on many other projects through Sinclair Research, Ltd., the company he founded.

Now Sinclair Research has come out with a new pocket-sized television, which Sinclair predicts will do for TV what the transistor did for radio. The dimensions of the set are 5 $\frac{1}{2}$ x3 $\frac{1}{2}$ x1 $\frac{1}{2}$ inches deep, with a 2 inch screen. The TV is available only by mail order at this time from Sinclair Research,

Ltd., and sells for \$120. (Sony's watchman is \$167 and Casio's mini-TV is \$200). It is expected to be sold in the U.S. for \$99 in late 1984. The TV's lithium cell battery holds a 15-hour charge which is several times that of rival mini-TV's. Pocket TV's may be as common as pocket calculators in a few years.

What other products can we expect from Sinclair Research, Ltd.? Sir Clive is said to be very interested in producing electric cars. Also in the works: robots, telecommunication devices, computer-aided design tools, and a new business/professional computer using "fifth-generation" technology.

Sinclair spends only a few hours a day in the office. He says "The office routine is an interruption to what I see as my real work - which is thinking."

As for TV-viewing, Clive says he watches it only "once in a blue moon." That should tell us something!

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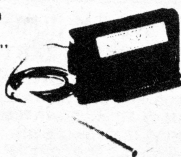
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COMPATIBILITY

The original ZX81 and later the TS1000 have been so popular that hundreds of companies in the United States, England, and Canada have developed literally thousands of products that are compatible with the Timex-Sinclair computer. This broad support opens up a potential that owners of some other computers are denied, either due to prohibitive expense or non-availability.

Yet there is a problem. Many Timex users have gone to great expense to expand their systems only to discover that components from different companies are not always compatible with each other.

As an example a recent letter to COMPUTE! describes one ZX81 owner's problem. He has a Memopak 32K RAM from Memotech that works fine with his ZX81, and a TS-2040 printer that works equally well. However he complains that when the printer and the RAM are both attached to the computer nothing works! In this case the problem seems to be an extra circuitry loop that reduces the RF emission from the printer. Timex is said to have made this modification to meet FCC guidelines. While it does not effect the Timex 16K RAM, the Memopaks (16K, 32K, 64K) have subtle differences, and in some cases the Memopaks are not compatible (although strangely, not always).

Local stores carrying Timex-related products where you can test new peripherals are few and far between, so what's the eager TS1000 owner to do? E. Arthur Brown's policy, according to their recent catalog, stresses a 10-day trial period for a hardware, during which any item can be returned for a full refund or exchange. This removes some of the anxiety about new hardware investments. Also, they try to keep tabs on the products they sell and indicate in their literature any compatibility problems they become aware of.

Actually, Postal regulations require that any item ordered through the mail be eligible for a full refund, for any reason, if the item is returned in essentially the same condition as shipped, for a period of ten days. (Obviously this excludes any attempted hardware kits.) However, when buying through the mail an uncooperative company can be hard to deal with. It is nice that at least one company has made the ten day trial period a matter of policy.

To help our readers with this increasingly common problem we will be printing "Compatibility Alerts" in the T-S News section of T-S Horizons. If you have any compatibility-type problems, let us know. In the meantime don't forget your right to a 10-day return period when you order anything by mail.

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TERMS: All advertising is payable in advance until an account is established. Ad agencies write for discount information.

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PUBLISHING FREQUENCY: MONTHLY.

- Even though most people seemed to agree that the premiere issue of T-S Horizons was a great first effort, we received quite a lot of constructive criticism. All of it is greatly appreciated. We want T-S Horizons to improve in quality and grow - both in distribution and number of pages - and the only way to accomplish that is to serve the needs and interests of our readers.

Some of the criticism we intend to act on. We want to provide more good program listings, and not-so-technical hardware articles, as you will see in coming issues. We also plan to improve general layout and proof-reading.

Some people are concerned about the format (newsprint, reduced page-size) of T-S Horizons, but most don't seem to be bothered. Our motto is "Affordable Quality for the Timex Computer User." The kind of quality we're talking about is not paper stock, but what's on the paper - the articles, programs, and information content.

Another concern expressed by some is one that we can't do anything about - the competition. It is true that there are several publications based on the Timex computer, but how many are monthly, cover the range of topics we cover, have 32 pages, have the same quality (of material!), and cost only \$1 per issue (by subscription)? I don't know of any. And don't forget. The best is yet to come.

Sincerely,

Rick Duncan
Rick Duncan

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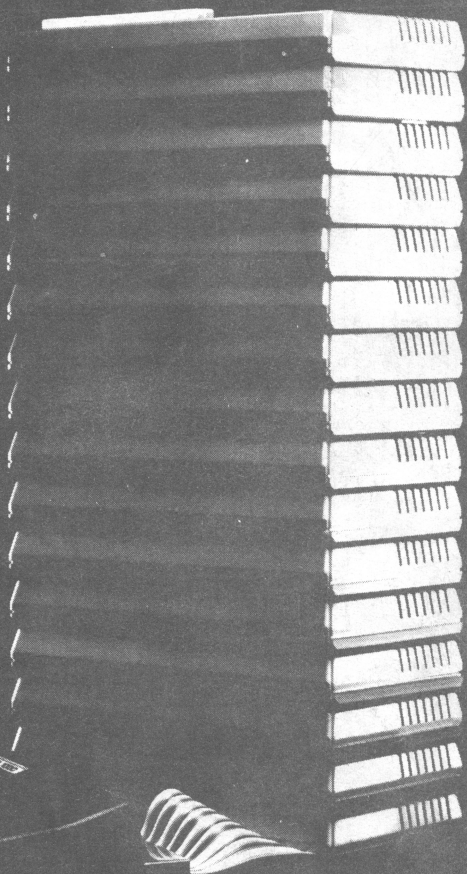
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